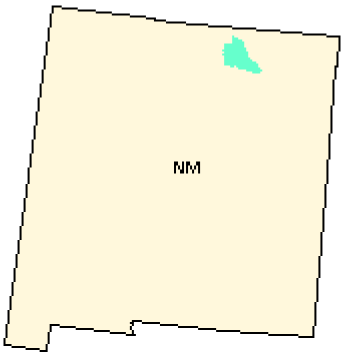
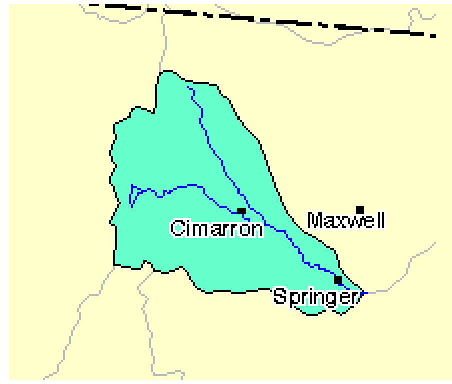
REVISED (JANUARY 2004)
TOTAL MAXIMUM DAILY LOAD FOR FECAL COLIFORM
IN SIX-MILE, CIENEGUILLA AND MORENO CREEKS
CANADIAN RIVER BASIN (CIMARRON)





Summary Table

New Mexico Standards Segment	**Canadian River Basin, 20.6.4.309**
Waterbody Identifier	Moreno Creek from the inflow to Eagle Nest Lake to the headwaters (CR2-30000) **Total Waterbody Mileage: 14.4 miles** Six-Mile Creek the inflow to Eagle Nest Lake to the headwaters (CR2-40000) **Total Waterbody Mileage: 6.6 miles** Cieneguilla Creek from the inflow to Eagle Nest Lake to the headwaters (CR2-50000) **Total Waterbody Mileage: 13.6 miles**
Parameters of Concern	Fecal coliform
Uses Affected	Secondary Contact
State Priority	4
Threatened or Endangered Species	None
Geographic Location	Canadian River Basin, Cimarron River Sub-Basin
Scope/size of watershed	Six-Mile Creek 10.5 mi^2 Moreno Creek 73.8 mi^2 Cieneguilla Creek 56 mi^2
Land type	Southern Rockies Ecoregion
Land use/cover	Forests, 89%; Rangeland 38%; Agriculture 9%; Urban, 1.4%; Water 0.6%
Identified Sources	Rangeland Grazing, Animal Holding/Management Areas, Wildlife Impacts, Onsite Wastewater Systems, Municipal Point Source
Watershed Ownership	89% Private, 9% Forest Service, 2% State.
TMDL Load Allocations: WLA + LA + MOS = TMDL Cieneguilla Creek Six-Mile Creek Moreno Creek	 1.89×10^9 + 4.46×10^9 cfu/day + 0 = 6.35×10^9 cfu/day 0 + 3.16×10^9 cfu/day + 0 = 3.16×10^9 cfu/day 0 + 5.01×10^9 cfu/day + 0 = 5.01×10^9 cfu/day

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List of Abbreviations

4Q3	Minimum average four consecutive day flow which occurs with a frequency of once in three years
BMP	Best Management Practice
BOD	Biochemical Oxygen Demand
CBOD	Carbonaceous Biochemical Oxygen Demand
CFS	Cubic Feet per Second
CFU	Colony Forming Unit
CWA	Clean Water Act
CWAP	Clean Water Action Plan
CWF	Cold Water Fishery
DMR	Discharge Monitoring Report
EPA	Environmental Protection Agency
HQCWF	High Quality Cold Water Fishery
LA	Load Allocation
MGD	Million Gallons per Day
mg/L	Milligrams per Liter
MOS	Margin of Safety
MULTI-SMP	Multiple Discharge Version of the Simplified Method Program
MQL	Minimum Quantification Level
NMED	New Mexico Environment Department
NPDES	National Pollution Discharge Elimination System
NPS	Nonpoint Sources
NTU	Nephelometric Turbidity Units
SWQB	Surface Water Quality Bureau
TA	Total Ammonia
TMDL	Total Maximum Daily Load
TP	Total Phosphorous
TRC	Total Residual Chlorine
TSS	Total Suspended Solids
UWA	Unified Watershed Assessment
WLA	Waste Load Allocation
WQLS	Water Quality Limited Segment
WQCC	New Mexico Water Quality Control Commission
WQS	Water Quality Standards
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to develop TMDL management plans for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a water body can assimilate without violating a state's water quality standards. It also allocates that load capacity to known point sources and nonpoint sources. TMDLs are defined in 40 CFR Part 130 as the sum of the individual Waste Load Allocations (WLA) for point sources and Load Allocations (LA) for nonpoint sources, including a margin of safety and natural background conditions.

Cieneguilla, Moreno and Six-Mile Creeks flow from their headwaters to a terminal discharge into Eagle Nest Lake. The New Mexico 1998 §303(d) report*, "State of New Mexico §303(d) List for Assessed Stream and River Reaches,"* lists this segment as being water quality limited for the following pollutants: stream bottom deposits, turbidity, and fecal coliform. Sampling results from intensive surveys conducted in 1998 support these listings. This Total Maximum Daily Load (TMDL) document addresses only the fecal coliform listing. TMDL documents addressing turbidity and stream bottom deposits were addressed in the SWQB *document Total Maximum Daily Load for Turbidity, Stream Bottom Deposits, and Total Phosphorous in the Canadian River Basin (Cimarron*) (1999).

New Mexico *Standards for Interstate and Intrastate Streams* (WQCC, 1995) (Standards) identify Cieneguilla, Six-Mile and Moreno Creeks as having an aquatic life use designation as high quality coldwater fishery with other designated uses of domestic water supply, irrigation, livestock watering, wildlife habitat, municipal and industrial water supply, and secondary contact. These Standards specify specific constituent criteria levels to be maintained so that the water body can support these designated uses. TMDL targets specified in this document are based on these water quality standards criteria. TMDL numeric targets are calculated so as to provide protection of designated uses. Load capacities are estimated as a function of these water quality targets and the assimilative capacity of these streams. Load allocations presented in this TMDL are based on the load capacities developed using these targets. Targets, loading analyses, and load allocations are presented for fecal coliform. These load analyses show that the estimated load capacities are currently exceeded, and therefore require reductions.

A general implementation plan for activities to be established in the watershed is included in this document. The Surface Water Quality Bureau's Point Source Regulation and Watershed Protection Section will further develop the details of this plan. Implementation of recommendations in this document will be done with full participation of all interested and affected parties. During implementation, additional water quality data will be generated. As a result targets will be re-examined and potentially revised; this document is considered to be an evolving management plan. In the event that new data indicate that the targets used in this analysis are not appropriate or if new standards are adopted, the load capacity will be adjusted accordingly.

NOTE: This TMDL was originally approved in December 1999. The TMDL for Cieneguilla Creek was revised in 2003 to include a wasteload allocation for the proposed Village of Angel Fire Wastewater Treatment Plant.

Background Information

The Cimarron River Basin, a sub-basin of the Canadian River Basin, is located in northeastern New Mexico. Eagle Nest Reservoir formed with a concrete dam is located in the headwaters of this sub-basin and collects flows from Cieneguilla, Six-Mile and Moreno Creeks prior to discharge through a natural rock spillway. Six-Mile Creek from the inflow to Eagle Nest Lake to the headwaters has a watershed of 10.5 square miles, Moreno Creek watershed encompasses 73.8 square miles and Cieneguilla Creek watershed encompasses 56 square miles. The mean annual precipitation is 13.1 inches.

Six-Mile, Cieneguilla, and Moreno Creeks are listed on the 1998 303(d) list with fecal coliform (FC) as a pollutant of concern. FC bacteria are that portion of the coliform group that are present in the gut of warm-blooded animals. It is an indicator of the possible presence of other bacteria that may limit beneficial uses and present human health concerns. Primary sources of FC are from human wastes, the source of greatest concern, and from other warm-blooded animals including wild or domesticated animals.

Water quality standards for these watercourses are set forth in sections 1102, 2306 and 3101 of the New Mexico water quality standards (NMWQCC, 1991). Section 2306 defines the designated uses of these streams as including; domestic water supply, irrigation, high quality coldwater fishery, livestock and wildlife watering, municipal and industrial water supply, and secondary contact recreation. The most stringent FC criterion is set forth in the segment specific standard (Section 2306) which states, "The monthly geometric mean of fecal coliform bacteria shall not exceed 100/100 ml; no single sample shall exceed 200 (cfu)/100 ml. Section 1103.B of the standard document states that the "monthly geometric mean shall be used in assessing attainment of standards when a minimum of five samples is collected in a 30-day period." For purposes of compliance with this standard a criterion of 200(cfu)/ 100 ml will be applied.

Surface water quality monitoring stations were used to characterize the water quality of the stream reaches. Stations were located to evaluate the impact of tributary streams and to establish background conditions **(Figures 1 and 2)**. As a result of this monitoring effort, several exceedances of New Mexico water quality standards for FC were documented on these streams flowing into Eagle Nest Reservoir. In all cases the exceedances were observed during summer months.

Figure 1

Cimarron Watershed - #11080002
Land Use/Cover

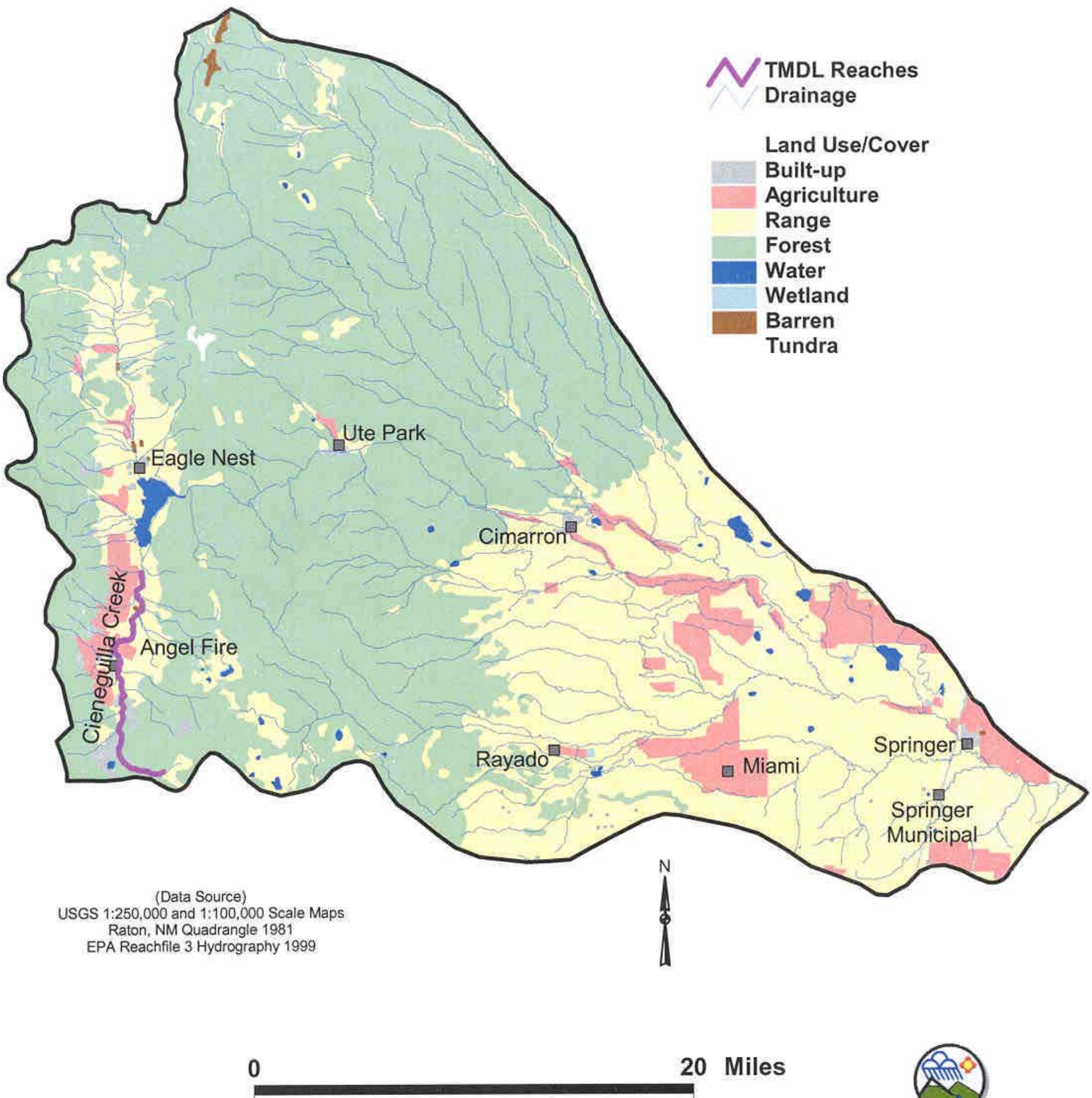
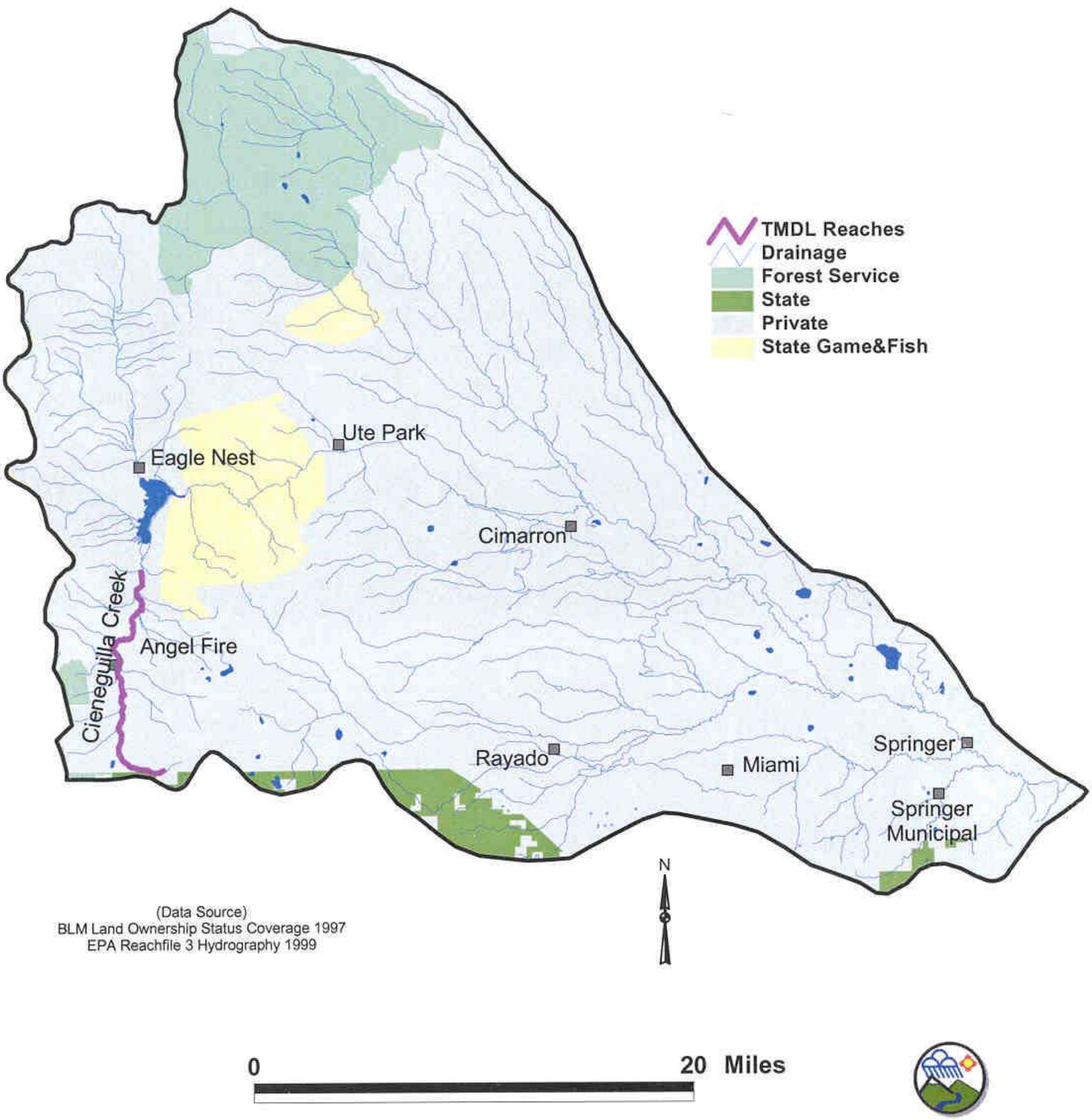


Figure 2

Cimarron Watershed - #11080002
Land Ownership



Identification of Sources

Sampling for FC has been conducted by the SWQB during surveys in 1992-1993 and 1998-1999. When available flows are from the USGS gages located at the lower ends of each stream.
Data from these surveys is summarized in **Table 1**.

Table 1. Results of fecal coliform monitoring from 1993 through 1999

Date	Cieneguilla Creek, cfu/100ml[1]	Cieneguilla Creek flow, cfs	Sixmile Creek cfu/100ml	Sixmile Creek flow, cfs	Moreno Creek cfu/100ml	Moreno Creek flow, cfs
12/2/92	3/62/55/24	--	19	--	19	
1/6/93	3/1/3/10/11	--	18	--	9	--
3/24/93	1/1/3/3/2	--	2	--	4	--
5/5/93	1/4/2/40	87	22	23	1	41
7/20/93	600/210/180 180/600	3.1	2500	.91	400	2.1
9/9/93	360/80/60/ 330/390	3.0	90	3.2	300	2.3
10/20/93	62/29/8/4/34	--	25	1.9	107	2.0
5/14/98	--	--	720	6.1	220	7.2
7/30/98	110/9	1.8	--	--	--	--
10/8/98	12/14	--	32	--	--	--
2/8/99	--	--	<10	--	1	--
3/15/99	14	5.4	2	2.1	14	1.7
4/19/99	7	6.8	1	1.3	1	2.3
6/1/99	77	21	200	3.9	86	20
7/6/99	>1600	8.9	>1600	1.3	>1600	8

[1] Multiple listings are values collected at different sites on the same day.

Point Sources

There is one potential point source discharger associated with the Cieneguilla Creek TMDL. The Village of Angel Fire Wastewater Treatment Plant (WWTP) proposes to discharge into Cieneguilla Creek (Permit No. NM0030503). The application notice from USEPA Region 6 is dated July 22, 2003

Nonpoint Sources

Howell et. al. (1996) found that FC concentrations in underlying sediment increase when cattle (*Bos taurus*) have direct access to streams. Sherer et al. (1992) found that FCs survived longer in fine sediments rather than coarse sediments. Both of these streams are listed in the New Mexico 303(d) list as impacted due to fine sediments. In addition to direct input from grazing operations FC concentrations in such streams may be subject to elevated levels as a result of re-suspension of FC laden sediment. Temperature also plays a role in FC concentrations.

Howell et. al. (1996) observed that FC re-growth increases as water temperature increases. Natural sources of FC are also present in the form of other wildlife such as elk, deer, and any other warm blooded mammals. The primary land-use in these watersheds is grazing with almost 90% of the land being privately held. Cattle have full access to the stream for most of the full length of each stream. During winter periods cattle are removed from the watershed and moved to lower elevations and are reintroduced during late spring and remain through early fall months. A seasonal pattern is present in the data presented in **Table 1**. As summer months approach, FC levels increase as: water temperatures increase, numbers of grazing stock increase, and summer rains contribute to re-suspension of FC laden sediments. Collectively in the three streams during the summer period late May through September 16/23 samples collected were above the criterion. Other seasonal values are well below criterion levels with 0/46 samples from non-summer months greater than the criterion.

TMDL Load Calculations

Calculations of Stream Loading Capacity

Given that fecal coliform standards are expressed as colonies per unit volume, using the criterion of 100-cfu/100 ml a target stream load can be calculated. The geometric mean criterion is utilized in these calculations because it is conservative. Also if the 200 cfu/100 ml were used as a target the geometric mean criterion of 100 cfu/100 ml may not be reached. This load is through application of the following conversion.

Equation 1

C as cfu/100 ml * 1000ml/1 L * 1 L/ 0.264 gallons * Q in gallons / day = Fu/day

Where: C = State water quality standard criterion, 100 CFU/100 ml
Q = defined stream flow in gallons

Point sources usually have a defined critical low receiving stream flow such as the 4Q3 at which the criterion must be met. For nonpoint sources it is important to recognize that there may be no single critical flow condition. The water quality criterion may be exceeded during low flow but it is equally likely that the criterion will be violated during wet weather events when the pollutant is washed off the land surface or re-suspended from contaminated sediments. To address this condition, and hopefully to increase understanding of the TMDL load determination process, a FC loading curve has been generated. This line is developed using **Equation 1**, substituting the criterion, 100 cfu/100 ml, for FC concentration and varying flow. The attempt here is to show that while a TMDL may be expressed as a single point it can also be thought of as a continuum of points representing the criterion value and various flow values. This curve is not stream dependent but is dependent upon the designated stream criterion. Therefore, it may be applied to any stream with a like FC criterion. This curve represents the TMDL loading allocation for FC on the above listed streams.

This loading capacity line is shown in Figures 3a,b,c. For any flow value x, one can quickly determine the FC loading value. For ease in dealing with very large numbers generated from FC loading conversions the y-value, FC concentrations, is expressed as the log 10 transformation of the FC concentration. The line formed by this series of points may be thought of as a boundary. At any given flow the loading may be below the line, within the boundary, or above the line. FC load values falling above the line represent disproportionately high values relative to the standard. FC load values falling below the line represent low loads relative to the standard. For the three streams addressed in this document values above the line generally occur within a flow range centered around 2 cfs. This is representative of summer flow conditions. To develop load reductions one simply needs to determine the appropriate flow value (x-axis) and see where it intersects the load allocation line. For example on the Cieneguilla Creek plot (**Figure 3a**) there are two measured data points at a flow of approximately 3 cfs and a log 10 cfu value of about 10.3. Taking the inverse log of 10.3 we arrive at a concentration of 1.995×10^{10} cfu/day. Using the same chart the loading curve value for 3 cfs is about 9.8 CFU. Again, converting this value to a concentration yields 6.31×10^{9} cfu/day. The load reduction for this value would be the difference of these values or 1.36×10^{10} cfu/day. Similar values may be calculated using graphs 3b and 3c for Six-Mile and Moreno Creeks. Flow values used are flows at actual sample times and are considered to be representative of summertime flow in these streams. These values are shown in **Table 2**.

Figure 3a. Fecal coliform loading curve for Cieneguilla Creek

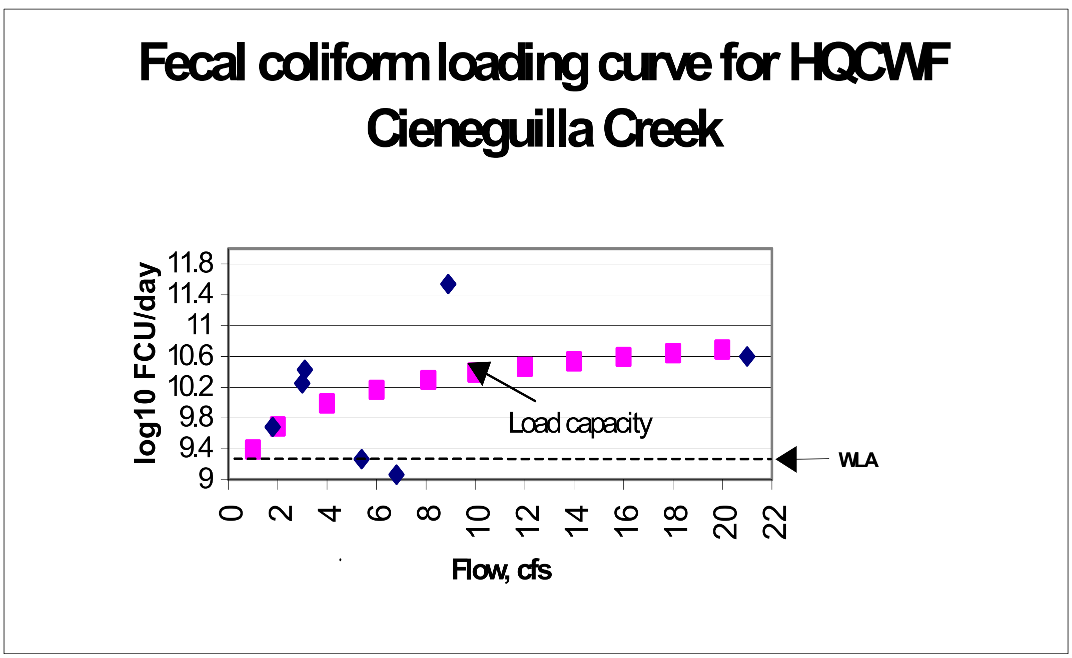


Figure 3b. Fecal coliform loading curve for Six-Mile Creek

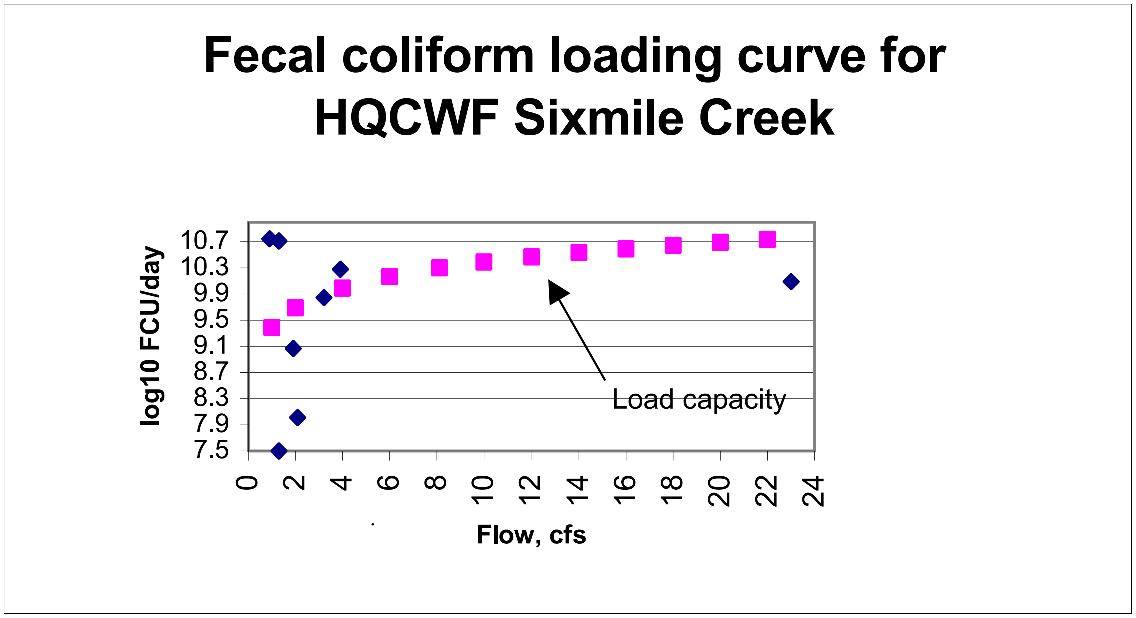


Figure 3c. Fecal coliform loading curve for Moreno Creek

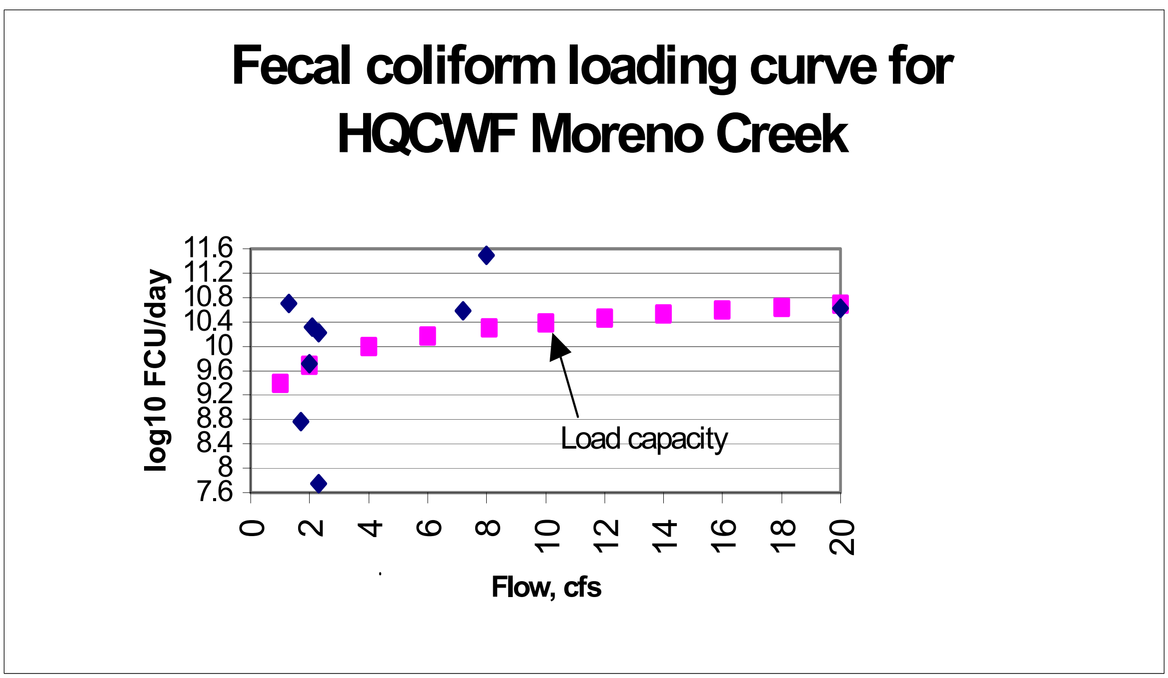


Table 2. Loading Calculations

Stream	Flow, cfs	Concentration, cfu/day	TMDL Load, cfu/day
Cieneguilla	3.0	$1.995\text{x}10^{10}$	$6.31\text{x}10^{9}$
Six-Mile	0.9	$5.01\text{x}10^{10}$	$3.16\text{x}10^{9}$
Moreno	2.0	$1.58\text{x}10^{10}$	$5.01\text{x}10^{9}$

Current Load Evaluations

A traditional expression of the FC loading may be developed by setting one critical or representative flow and concentration, and calculating the load allocation using Equation 1. The difficulty with this approach is in the determination of the appropriate flow or concentration value to use. From Table 1 one can see that summer flow values are highly variable. For example, Cieneguilla Creek ranges from a low of 3.0 cfs to a high of 21 cfs. Six-Mile and Moreno Creeks are equally variable making it difficult to establish a critical flow. FC levels in the streams have no definable pattern as well. On Cieneguilla Creek the FC concentration was 77 FC/100 ml at a flow of 21 cfs and >1600 FC/100 ml at 8.7 cfs. Selection of an appropriate flow for expressing the TMDL can be difficult. This document proposes an alternative solution to the traditional approach. Utilizing the charts developed in the previous section it is possible to quickly evaluate deviations, both in magnitude and frequency from the criterion. For example, from the Cieneguilla Creek curve**, Figure 3a**, it can be determined that four of seven points fall above the curve. From a similar evaluation of **Figures 3b,c**, for Six-Mile and Moreno Creeks it can be seen that both the frequency (5/9) and magnitude of exceedances are greater in Moreno Creek. A deviation from the criterion can be calculated for each individual excursion. These values may then be averaged to obtain a mean deviation from the standard. This value has more meaning in that it has been calculated using actual reductions at several points. Load reductions calculated in this manner, yield average load reduction values of $1.12\text{x}10^{10}$ cfu/day for Cieneguilla Creek, $3.5\text{x}10^{10}$ cfu/day for Six-Mile Creek, and $9.1\text{x}10^{10}$ cfu/day for Moreno Creek.

Waste Load Allocation (WLA)

The Village of Angel Fire WWTP proposed design flow is 0.500 mgd. Under the conditions of the TMDL, the permittee will be required to meet segment specific fecal coliform standards after final treatment. The limits will be 100 cfu/100 mL as a 30-day geometric mean and a single sample maximum of 200 cfu/100 mL. Applying these values to equation 1, the 30-day geometric mean waste load allocation is $1.89 \text{ x } 10^{9}$ cfu/day:

100 fcu/100 ml * 1000mL/1 L * 1 L/ 0.264 gallons * 500000 gallons/day design flow

The log of this value is 9.27 (see Figure 3a). This line is straight because the design flow of the

WWTP is a constant value.

Load Allocation (LA)

The full allocations for Six Mile Creek and Moreno Creek are applied to the load allocation (LA). In order to calculate the LA for Cieneguilla Creek, the waste load allocation and margin of safety (MOS) were subtracted from the target capacity (TMDL) following Equation 2.

Equation 2. $WLA + LA + MOS = TMDL$

The Margin of Safety is implicit in this TMDL calculation, and therefore zero (see Margin of Safety section below). Results are presented in Table 3.

Table 3: Calculation of fecal coliform TMDL for Cieneguilla Creek

Location	WLA (cfu/day)	LA (cfu/day)	MOS (implicit)	TMDL (cfu/day)
Cieneguilla	1.89×10^9	4.46×10^9	0	6.35×10^9

No attempt is made to define a background level. The background level is included in the LA. There is no appropriate stream in this watershed that allows determination of least impacted conditions. NMED has not established background concentrations for FC values for broader regions.

Seasonal Variability

There is an identifiable seasonal trend associated with FC in these watersheds with the critical period for FC being generally late-May to mid-September. This TMDL has been developed along a continuum formed by the variation in flow and the water quality standard criterion. The criterion is applicable to all seasons. This presentation addresses all flow conditions observed on this segment without creating an artificial "critical" flow condition.

Future Growth

This area is undergoing some growth due to the development of the resort area of Angel Fire. Estimations of future growth are not anticipated to lead to a significant increase for fecal coliform that cannot be controlled with best management practice implementation in this watershed.

Margin of Safety (MOS)

TMDL regulations allow the use of implicit or explicit expression of the MOS. When conservative assumptions are used to develop the model calculation the MOS can be implicit.

TMDLs in this document have an implicit MOS. Significant conservative assumptions have been used in developing these loading limits. These include:

- Using the more conservative limit of 100 cfu/100 ml, when the standard allows up to 200 cfu/100 ml for individual grab samples, to calculate loading values,
- treating fecal coliform as a conservative pollutant, that is, a pollutant that does not readily degrade in the environment,

TMDL Specific Monitoring

Although there are sufficient data available to prepare a TMDL, a database sufficient to characterize the diffuse sources of fecal coliform bacteria does not exist. Additional sampling needs to be conducted to characterize upstream sources of fecal coliform bacteria. The TMDL specific sampling program will incorporate a scheme that will allow evaluations of seasonal loading as well as identification of specific sources. A monitoring plan will be developed to address each of these components. To develop this program the SWQB will continue its monthly FC monitoring program at representative stations along these streams. In addition this sampling should be expanded to include a geometric mean sampling event during this critical season. Additional sites along each stream should be sampled to establish specific sources of fecal contamination. There will be a fecal coliform monitoring requirement in the approved NPDES permit with a re-opener clause which will be utilized if the discharge limitations of 100 cfu/100 mL 30-day geometric mean or 200 cfu/100 mL single sample are exceeded.

Implementation Plan

Management Measures

Management measures are "economically achievable measures for the control of the addition of pollutants from existing and new categories and classes of nonpoint sources of pollution, which reflect the greatest degree of pollutant reduction achievable through the application of the best available nonpoint pollution control practices, technologies, processes, siting criteria, operating methods, or other alternatives" (USEPA, 1993). A combination of best management practices (BMPs) will be used to implement these TMDLs. Riparian fencing would be an example of a BMP that might e implemented to reduce FC. Public outreach and stakeholder involvement in implementation of these TMDLs will be ongoing. Stakeholder participation will range from choosing to install BMPs, to the potential for volunteer monitoring. Because almost 90% of these watersheds are privately held public outreach and public involvement will be critical to the success of the plan.

Timeline

Implementation Action	Year 1	Year 2	Year 3	Year 4	Year 5
Public Outreach and Involvement	X	X	X	X	X
Establish Milestones	X				
Secure Funding	X				
Implement Management Measures (BMPs)		X	X		
Monitor BMPs			X	X	X
Determine BMP Effectiveness					X
Re-evaluate Milestones				X	X
Achieve compliance with standards					X

Assurances

The Water Quality Act (20 NMAC 6.2) (NMWQCC 1995a) states in §74-6-12(a):

> *The Water Quality Act (this article) does not grant to the commission or to any other entity the power to take away or modify the property rights in water, nor is it the intention of the Water Quality Act to take away or modify such rights.*

In addition, the State of New Mexico Surface Water Quality Standards (see Section 1100E and Section 1105C) (NMWQCC 1995b) states:

> *These water quality standards do not grant the Commission or any other entity the power to create, take away or modify property rights in water.*

New Mexico policies are in accordance with the federal Clean Water Act §101(g):

> *It is the policy of Congress that the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this Act. It is the further policy of Congress that nothing in this Act shall be construed to supersede or abrogate rights to quantities of water which have been established by any State. Federal agencies shall co-operate with State and local agencies to develop comprehensive solutions to prevent, reduce and eliminate pollution in concert with programs for managing water resources.*

New Mexico's Water Quality Act does contain enforceable prohibitions directly applicable to nonpoint sources of pollution. The New Mexico Water Quality Act authorizes the Water Quality Commission to "promulgate and publish regulations to prevent or abate water pollution in the state" and to require permits. Several statutory provisions on nuisance law could also be applied to nonpoint source water pollution. As a constituent agency, NMED has the authority under Chapter

74, Article 6-10 NMSA 1978 to issue a compliance order or commence civil action in district court for appropriate relief if NMED determines that actions of a "person" (as defined in the Act) have resulted in a violation of a water quality standard. NMED nonpoint source water quality management program has historically strived for and will continue to promote voluntary compliance to nonpoint source water pollution concerns by utilizing a voluntary, cooperative approach. The State provides technical support and grant money for the implementation of best management practices and other NPS prevention mechanisms through §319 of the Clean Water Act. Since this TMDL will be implemented through NPS control mechanisms the New Mexico Watershed Protection Section is targeting efforts to this and other watersheds with TMDLs. The Watershed Protection Section coordinates with the Nonpoint Source Taskforce. The Nonpoint Source Taskforce is the New Mexico statewide focus group representing federal and state agencies, local governments, tribes and pueblos, soil and water conservation districts, environmental organizations, industry, and the public.

This group meets on a quarterly basis to provide input on the Section 319 program process, to disseminate information to other stakeholders and the public regarding nonpoint source issues, to identify complementary programs and sources of funding, and to help review and rank Section 319 proposals. In order to ensure reasonable assurances for implementation in watersheds with multiple landowners, including Federal, State and private land, NMED has established MOUs with different Federal agencies, in particular the Forest Service and the Bureau of Land Management. MOUs have also been developed with other State agencies, such as the New Mexico Highway Department. These MOUs provide for coordination and consistency in dealing with nonpoint source issues.

New Mexico's Clean Water Action Plan has been developed in a coordinated manner with the State's 303(d) process.

All Category I watersheds identified in New Mexico's Unified Watershed Assessment process are totally coincident with the impaired waters list for 1996 and 1998 approved by EPA. The State has given a high priority for funding assessment and restoration activities to these watersheds.

The time required to attain standards in this case is estimated to be 5 years.

Milestones

Milestones will be used for determining if control actions are being implemented and standards attained. For this TMDL several milestones will be established including the following:

- Understanding the contributions of natural sources such as wildlife
- Conducting in-depth fecal coliform sampling to identify areas of concern
- Develop BMPs to reduce fecal coliform loading
- Implementation of BMPs

Milestones will be reevaluated periodically, depending on what BMPs were implemented. Further implementation of this TMDL will be revised based on this reevaluation.

Monitoring Plan

Pursuant to Section 106(e)(1) of the Federal Clean Water Act (33U.S.C. э 1251 et seq.), the SWQB has established appropriate monitoring methods, systems, and procedures in order to compile and analyze data on quality of surface waters of New Mexico. In accordance with the New Mexico Water Quality Act (NMSA, 1978, э 74-6-1 et seq.), the SWQB has developed and implemented a comprehensive water quality monitoring strategy for surface waters of the State. The monitoring strategy establishes methods of identifying and prioritizing water quality data needs, specifies procedures for acquiring and managing water quality data, and describes how these data are used to progress toward three basic monitoring objectives. These objectives are development of water quality-based controls, to evaluate the effectiveness of such controls, and to conduct water quality assessments.

The SWQB utilizes a rotating basin system approach to water quality monitoring. In this system, a select number of watersheds are intensively monitored each year with an established return frequency of five years.

The SWQB maintains current EPA approved quality assurance and quality control plans to cover all monitoring activities. This document, the "Quality Assurance Project Plan for Water Quality Management Programs" (QAPP), is updated annually. The QAPP identifies data quality objectives required to provide information of sufficient quality to meet established goals of the program. Additional site-specific QAPP documents are prepared for each stream survey to assure these objectives are being met.

Current priorities for monitoring surface waters are driven by the CWA 303(d) list of streams requiring TMDLs. Short-term efforts will be directed toward those waters that are on the TMDL consent decree list (Forest Guardians, 1997) and that are due within the first two years of the monitoring schedule. Once assessment monitoring is completed, those reaches still showing impacts and requiring a TMDL will be targeted for more intensive monitoring.

Methods of data acquisition include; fixed-station monitoring; intensive surveys of priority water bodies including biological assessments, and compliance monitoring of industrial, federal, and municipal discharges', and are specified in the SWQB assessment protocol.

Long term monitoring for assessments will be accomplished through establishment of sampling sites that are representative of the water body and which can be revisited every five years. This gives an unbiased assessment of the water body and establishes a long term monitoring record for simple trend analyses. This information will provide time relevant information for use in CWA э305(b) assessments and to support the need for developing TMDLs.

This approach provides:

- a systematic, detailed review of water quality data and allows for a more efficient use of valuable monitoring resources,

- information at a scale where implementation of corrective activities is feasible,
- an established order of rotation and predictable sampling in each basin that allows coordinated efforts with other programs,
- for enhanced efficiency and improves the basis for management decisions.

It should be noted that a basin is not ignored during its 4 year sampling hiatus. The rotating basin program will be supplemented with other data collection efforts that will be classified as field studies. This time will be used to analyze data collected, to conduct field studies to further characterize identified problems, to develop TMDLs, and implement corrective actions. Both types of monitoring, long term and field studies, can contribute to the CWA э305 and э303 listing processes, but they should be stored in the primary database with distinguishing codes that will allow for separate data retrievals.

The following schedule is a draft of the sampling seasons through 2002 and will be done in a consistent manner to support the New Mexico Unified Watershed Assessment (UWA) and the Watershed Protection Section. This sampling regime will reflect seasonal variation by sampling in spring, summer, and fall for each of the watersheds.

1998 - Jemez, Chama (above El Vado), Cimarron (above Springer), Santa Fe River, San Francisco
1999 - Chama (below El Vado), Middle Rio Grande, Gila River Watershed, Red River Watershed
2000 - Dry Cimarron Basin, Upper Rio Grande (1)
2001 - Upper Rio Grande (2), Upper Pecos (Ft. Sumner to headwaters), Valles Caldera
2002 - Canadian Basin (East), Mimbres, San Juan River Basin

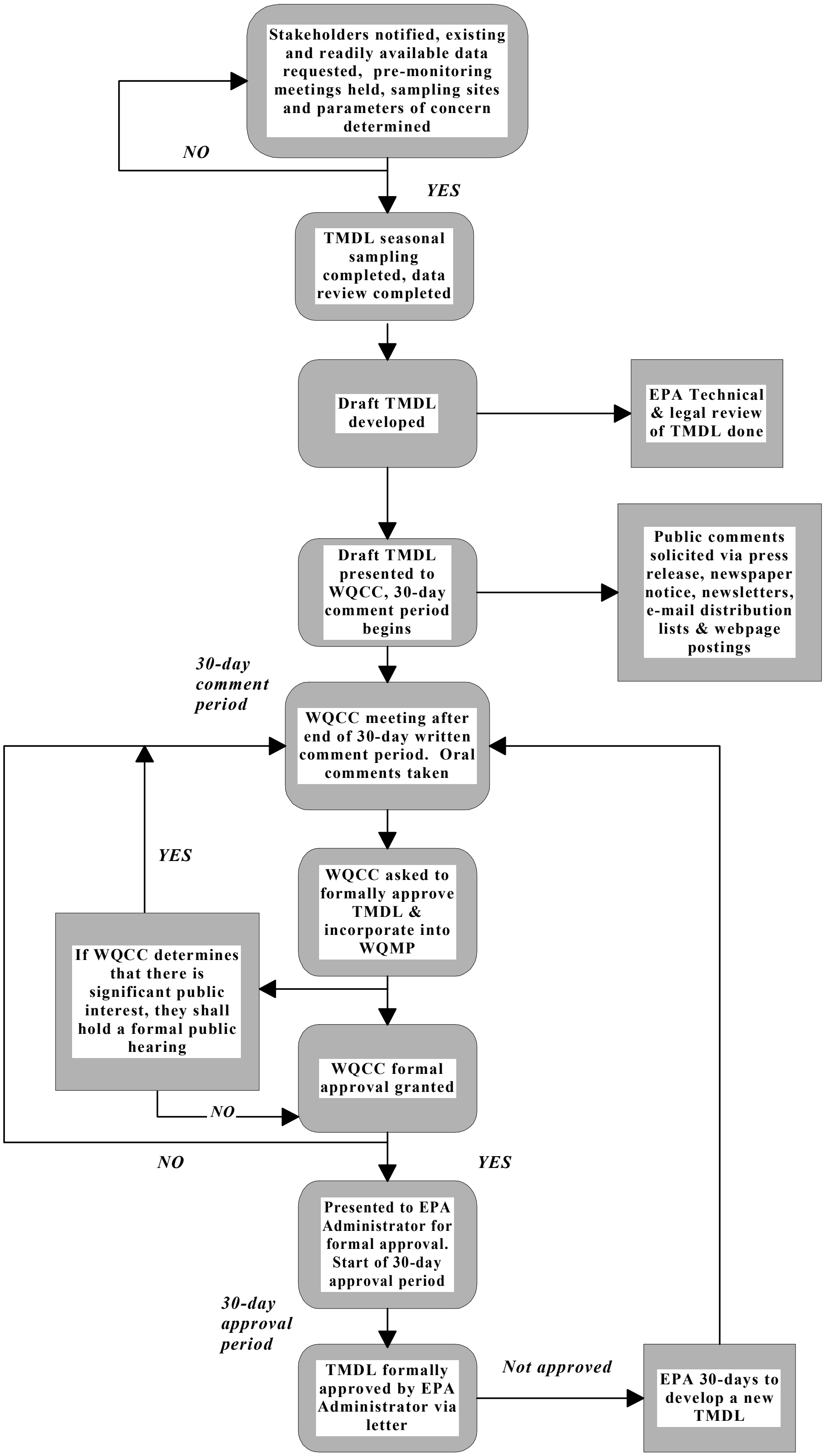
In addition to the regularly scheduled instream monitoring, NPDES compliance monitoring will be conducted. NPDES discharge monitoring will include regular monitoring requirements for each of the TMDL parameters to assure continued compliance. Regularly scheduled inspections, conducted by the PSRS will also be conducted to assure compliance with permit requirements. As used in this strategy, "compliance monitoring" is a generic term that includes all activities conducted by the SWQB to verify compliance or non-compliance with effluent limitations and other conditions of NPDES permits. The SWQB routinely conducts two types of compliance monitoring activities: compliance evaluation inspections (CEI) and compliance sampling inspections (CSI). As part of the terms of the reissued NPDES permit the permittee will be required to conduct regular compliance monitoring and report this information to the SWQB and EPA through quarterly Discharge Monitoring Reports.

Public Participation

The purpose of public participation is to involve all of the interested stakeholders from the start of the process. This requires the sharing of results from the sampling efforts and an indication of what TMDLs will be necessary, along with the implementation plans of these TMDLs **(Figure**

4). The original draft TMDL was made available for a 30-day comment period in 1999. The revised draft TMDL was made available for a 30-day public comment starting October 14, 2003. Public comments and responses can be found in ***Appendix A*** of this document. The draft document notice of availability was extensively advertised via newsletters, email distribution lists, webpage postings (http://www.nmenv.state.nm.us), and press releases to area newspapers.

Figure 4. Public Participation Flowchart



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Appendices

Appendix A Public Comments

NO COMMENTS WERE RECEIVED ON THE ORIGINAL TMDL.